

FIRST EVIDENCE OF VOLCANISM ON THE ANAFI ISLAND

E. Hejl & J. Leichmann

Institute for Geology and Paleontology
University of Salzburg, Hellbrunnerstrasse 34, A-5020 Salzburg, Austria

Anafi Island is situated approximately 20 km west from the island of Thira, which belongs to the archipelago of Santorini. Its geographical position suggests that Anafi could belong to the present-day Hellenic volcanic arc. However, no volcanic activity was reported from the island yet. REINECKE et al. [1] described four major tectono-stratigraphic units. They are from the base to the top:

- 1) Palaeogene flysch
- 2) Series of greenschists
- 3) High temperature metamorphites and associated granites
- 4) Theologos formation – continental sediments of Plio- to Pleistocene age [2]

We found several geological phenomena, indicating that the Anafi Island was affected by volcanic and hydrothermal activity in Neogene and/or Quaternary times. They are: (i) Dikes and sills of rhyolites, (ii) hydrothermal veins and hydraulic fractured rocks, (iii) penetrative hydrothermal alteration of country rock.

Dikes of Rhyolite (i) with a thickness of up to 2 m intruded the units 2, 3 and 4. In addition to the dikes, rhyolite sills with a thickness of up to 1 m occur in the basal part of the Theologos formation (unit 4). Within the fine-grained sediments of the latter, the rhyolite intrusions have caused contact metamorphic rims. The evidence of volcanic activity is restricted on the basal members of Theologos formation. We suppose therefore that the volcanism was contemporaneous with the opening of the basin.

The rhyolites are porphyritic rocks with corroded quartz phenocryst, up to 5 mm large. The feldspar phenocrysts are replaced by a mixture of clay mineral close to nacrite, and Ba-rich muscovite. The matrix consists of clay minerals, chemically identical with those from phenocryst, but much finer-grained, and quartz. The matrix is locally strongly carbonatized, thus the rock can be mistaken with marble being common on the island. Some veins contain large xenolites of country rocks within the fine-grained matrix. Apart from massive rhyolites we found layers of black volcanic glass at the base of Theologos fm., spatially close related to rhyolite veins. The siliciclastic sediments of the basal Theologos fm. contain an important portion of reworked volcanic material.

Hydrothermal carbonate veins (ii) are very common, mainly in the rocks of the third tectonic unit. They are several hundred meters long and up to 30 cm thick. In association with these veins, hydraulic fractured breccias appear rarely. These breccias form irregular domains several tens of meters in diameter. The matrix between the rock fragments is mainly carbonate. Some carbonate veins are associated with faults, which are manifested by several meters high and up to 500 m long scarps.

The rhyolites as well as carbonate veins are accompanied by several hundred meters thick alteration zones (iii). The original feldspar of felsic rocks is strongly kaolinised, the mafic rocks are limonitised. Carbonatisation is very common too. The alteration affects all four main tectonic units.

Because the volcanic and hydrothermal activity affects even the Plio-Pleistocene rocks of the Theologos fm., we suppose that this volcanic activity is closely connected with the magmatism in the present-day Hellenic arc. The volcanic activity of Anafi Island was short-lived only. The volcanism was probably initiated by an extensional event contemporaneous with the formation of the Theologos sedimentary basin. Syn- and postsedimentary folding of the Theologos fm. indicates rapid quenching of the extensional regime, which was followed by compression and extinction of volcanic activity.

Literature

- [1] REINECKE, E., ALTHERR, R., HARTUNG, B., HATZIPANAGIOTOU, K., KREUZER, H., HARRE, W., KLEIN, H., KELLER, J., GEENEN, E. & BÖGER, H. (1982): Remnants of a Late Cretaceous High Temperature Belt on the Island of Anáfi (Cyclades, Greece). - N. Jb. Miner. Abh., 145, 2, 157-182.
- [2] VORWERK, W., (1979): Das Neogen im Nordwestteil der Insel Anaphi (Kykladen) Griechenland. Unpubl. - Diplomarbeit. Math. naturwiss. Fakultät, Universität Kiel. 83 p.